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(54) Verbindungseinrichtung

(57) Verbindungseinrichtung zwischen Holzbalken, -trägem und dergleichen Hölzern, insbesondere zwischen stumpf aneinander stoßenden Hölzern, deren Längsachsen gleichlaufend in der Art von Gerberverbindern, oder quer zueinander, in der Art von Balkenschuhverbindungen oder Integralverbindungen verlaufen. Eine Metallplatte (4) ist zur Überspannung des Stumpfstoßes (3) zwischen angrenzenden Hölzern (1,2) auf deren Oberseite vorgesehen und enthält Gewindebohrungen (5 bis 10) zum Durchgriff von Gewindebolzen (15 bis 20), die jeweils einen Holzgewindeschaft (21) mit Spitze (24) und einen Kopfansatz (22) mit Metallgewinde aufweisen. Der Kopfansatz (22) greift mit seinem Kopfgewinde (28) in die Gewindebohrungen (5 bis 10) der Metallplatte (4) ein und weist innere Antriebsflanken (27) auf, die den Drehantrieb der Gewindebolzen ermöglichen.

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54 Connecting device

57 A connecting device between wooden beams, wood girders and similar wooden members, especially between butt-joined wooden members whose longitudinal axes are collinear in the manner of Gerber joints or crosswise in the manner of joints formed with beam shoes or of integral joints. A metal plate (4), provided for spanning the butt joint (3) between adjoining wooden members (1, 2) on the upper side thereof, contains threaded holes (5 to 10) for engagement with threaded studs (15 to 20), each of which comprises a shank (21), provided with wood threads and a point (24), and a head extension (22), provided with metal threads. The head extension (22) engages with its head thread (28) in the threaded holes (5 to 10) of the metal plate (4) and is provided with internal drive flanks (27), which permit rotary drive of the threaded studs.

Description

[0001] The invention relates to a connecting device between wooden beams, wood girders and similar wooden members, especially between butt-joined wooden members whose longitudinal axes are collinear in the manner of Gerber joints or crosswise in the manner of joints formed with beam shoes or of integral joints, according to the preamble of claim 1.

[0002] For joining wooden beams whose faces are oriented in crosswise directions, there are used sheet-metal beam shoes which are anchored with screws or nails to the crosswise faces. In many cases it is undesirable for such beam shoes to be visible. Therefore there have been developed hidden or integral connectors, which unfortunately are difficult to assemble (German Patents 3914618 A1 and 4124553 A1; German Utility Model 88-12680).

[0003] A connecting device according to the preamble of claim 1 is known from German Utility Model 89-14213, wherein the metal plate is provided with smooth holes, against each of which there bears a transition portion – disposed between head and threaded portion – of the respective threaded stud, which has a head protruding above the metal plate. The head is capable of supporting forces only in one direction.

[0004] The object of the invention is to provide, between wooden members, a joint that is hardly visible, that can be easily assembled and that is suitable for transmission of tensile and compressive forces.

[0005] This object is achieved on the basis of the teaching of claim 1.

[0006] The metal plate spanning the butt joint is made of high-strength material, especially steel, and is capable of transmitting large forces between the wooden members to be joined, but by virtue of its attachment point on the upper side of the wooden members is visible only from the narrow side, unless the upper side is concealed in any case in a ceiling construction. In order to transmit the forces between the wooden members to the steel plate, the steel plate is provided with threaded holes capable of transmitting both tension and compression. To these threaded holes there correspond head extensions of threaded studs, which are provided with internal drive

flanks. Furthermore, the threaded studs are provided with wood threads, to ensure that they can be anchored in the wooden members. The high-strength threaded studs can transfer, to the relatively short length of their head extensions, the forces developed on the steel plate, for the purpose of preventing bending stresses in the steel plate. For this reason threaded holes are disposed as close as possible to the butt joint to be spanned, where the moment curve of the beams is almost zero. At this point, however, there exists the risk of bursting of the wood, especially when the wood fibers extend out to the end faces thereof. For this reason a value other than 90° is chosen for the angle of entry of the threaded stud, so that its lower end penetrates further into the wood than does the upper end. A suitable entry angle is 90° ± 15°, where 15° represents the inclination relative to the normal perpendicular.

[0007] The threaded holes can be predrilled in the wood; nevertheless, a self-cutting design of the wood thread on the threaded studs is preferred, in order to minimize working time. Similarly, it is preferable that the threaded stud also be able to cut its own thread in the steel plate.

[0008] The invention will be described with reference to the drawing, wherein:

Fig. 1 shows a perspective view of two wooden members in the region of their butt joint, which is spanned by the connecting device;

Fig. 2 shows an application as a Gerber joint with two rows of screws; and

Fig. 3 shows a threaded stud.

[0009] In the application shown in Fig. 1, the known beam shoe or integral connector is replaced. Beams 1 and 2 oriented crosswise relative to one another engage with one another along a butt joint 3, which on the upper side of beams 1, 2 is spanned by a steel plate 4. Steel plate 4 has four holes 5, 6, 7 and 8, which in this case are disposed in a row but which can also be offset relative to one another. Into each hole there is driven a threaded stud 15, 16, 17, 18, each penetrating to a different depth into wooden members 1, 2. Threaded studs 16, 17 close to the butt joint are approximately twice as long as threaded studs 15, 18, which are distant from the butt

joint, and they are inclined by 15° relative to the perpendicular, such that their lower ends diverge.

[0010] Fig. 2 shows a Gerber joint, or in other words the joint between wooden members with collinear longitudinal axes. The butt joint 3 of such Gerber joints is located if at all possible at the point of zero moments of a continuous girder. The support point (not illustrated) is located, for example, to the left of steel plate 4. Six holes 5 to 10 and six threaded studs 15 to 20 are illustrated, the threaded studs close to the butt joint being disposed opposite one another in pairs.

[0011] Fig. 3 illustrates one of the threaded studs 16, 17, 19, 20. It has a shank 21, a head extension 22 and a connecting, slightly tapered neck 23. The lower end of shank 21 is designed as point 24 with groove 25. The major part of the shank is provided with wood thread 26 of self-cutting design, meaning that it can bite into standard construction wood without pre-drilling when threaded stud 20 is appropriately driven. For this purpose head extension 22 is provided with an axial indentation 27 with drive flanks, otherwise known as a Torx drive. Externally, the head extension 22 is provided with hardened head thread 26, which is suitable for cutting the threads of holes 5 to 10 and comprises, for example, cutting grooves (not illustrated).

[0012] The thickness of steel plate 4 matches the axial length of head extension 22, so that head extension 22 can be countersunk in steel plate 4. Since the thread in the associated holes 5 to 10 has been produced as a mating thread for cutting thread 28, it engages intimately around the circumference and permits good distribution of force transmission. For driving in threaded studs 15 to 20, it may be expedient to use a gauge for each, so that the driving angle can be maintained accurately.

[0013] As illustrated, different driving angles are chosen for the studs close to the butt joint and those distant from the butt joint. Whereas the latter have the normal driving angle of 90°, studs 6, 7 and 9, 10, which are close to the butt joint, are driven at an angle of 90° ± 15°, in such a way that the points 24 of the studs diverge. It is self-evident that the axes of holes 6, 7, 9, 10 are correspondingly inclined.

[0014] Examples of the dimensions of the threaded stud are as follows:

total length 160 mm,
length of metal thread portion 8 mm,
length of wood thread portion 120 mm,
head diameter 9 mm,
body thickness at the head extension 8 mm,
shank thickness 7.5 mm,
body thickness at the wood thread portion 6 mm,
lead of the metal thread 1 mm,
lead of the wood thread 2 mm,
flank angle of the metal thread 55°,
flank angle of the wood thread 30 °.

[0015] It is self-evident that dimensions deviating in a wide range from the foregoing values can be chosen in order to adapt to the thickness dimensions of the wooden members to be joined.

[0016] Instead of the use of cutting threads 28 and smooth holes 5 to 10, it is also possible to use predrilled threaded holes 5 to 10 in combination with standard machine threads of studs 15 to 20.

Claims

1. A connecting device between wooden beams, wood girders and similar wooden members, especially between butt-joined wooden members whose longitudinal axes are collinear in the manner of Gerber joints or crosswise in the manner of joints formed with beam shoes or of integral joints, with the following features:

a metal plate (4) for spanning the butt joint (3) between adjoining wooden members (1, 2) on the upper side thereof;
the metal plate (4) contains through holes for engagement with threaded studs;

a plurality of threaded studs (15 to 20), each of which comprises a shank (21) with a point (24) at the lower end, and a head extension (22) at the upper end, the shank (21) being provided with wood threads;

characterized by the following provisions:

the through holes are formed at the latest during final assembly as threaded holes (5 to 10), at least two (6, 7) of which are disposed close to the butt joint (3), in such a way that one threaded hole is positioned respectively on each side of the butt joint;
the head extension (22) is provided externally with a head thread (28), which engages in the threaded holes (5 to 10) of the metal plate (4);
the head extension (22) is provided with internal drive flanks (27), which permit rotary drive of the threaded studs.

2. A connecting device according to claim 1,
characterized in that the head thread (28) is designed as a cutting thread for metal.

3. A connecting device according to claim 1, or 2
characterized in that the axes of the threaded holes (6, 7; 9, 10) close to the butt joint are inclined away from the butt joint (3).

4. A connecting device according to claim 3,
characterized in that the angle of inclination is 10° to 20°.

5. A connecting device according to claim 3 or 4,
characterized in that the wood thread (26) is of self-cutting design and/or the shank point (24) is provided with at least one cutting groove (25).

6. A connecting device according to one of claims 1 to 5, characterized in that the head thread (28) is a cylindrical thread with lead and depth of about 1 mm on a head having a diameter of about 9 mm.

7. A connecting device according to claim 6, characterized in that the head thread (28) has a flank angle of about 55°.

8. A connecting device according to one of claims 1 to 7, characterized in that the wood thread (26) has a lead of about 2 mm and a thread depth of about 1.5 mm on a shank having a diameter of about 7.5 mm.

9. A connecting device according to claim 8, characterized in that the wood thread (26) has a flank angle of about 30°.

10. A connecting device according to one of claims 1 to 9, characterized in that the axial length of the head thread (28) ranges from 6 to 10 mm.

11. A connecting device according to one of claims 1 to 10, characterized in that the total length of the threaded stud (20) close to the butt joint ranges from 100 to 200 mm, whereas the threaded stud distant from the butt joint has about half the length of the threaded stud close to the butt joint.

Translator's notes re EP 0937832

1. Par. 0011
"18" is omitted from the list of studs

2. Par. 0013
"studs 6, 7 and 9, 10" should be "studs 16, 17 and 19, 20"